LONG-TERM PRICE LINKAGES OF THE TOP TEN RMFS AND LTFS WITH THE SET INDEX: A CASE OF UNIDIRECTIONAL GRANGER CAUSALITY RELATIONSHIP

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Abstract: *The main objective of this research is to examine the response of the top 10 Retirement Mutual Funds (RMFs) and Long-term Equity Funds (LTFs) ranked by Morningstar Thailand on the percentage change in the Stock Exchange of Thailand's Index (SET Index) during the period from January 2011 to May 2014. To examine, Granger causality test is performed to verify the existence of the unidirectional causality relationship. The researcher found that return of SET Index Granger caused 5 out of Top 10 RMFs and 2 out of Top 10 LTFs. These findings will help investors to make decision on which funds to invest that best serve their preferences. However, the limitation to this study is that it does not indicate whether the change of one variable has negatively or positively affected the other variable. In any case, the practical implication for investors is for them to observe the changes of SET Index to study the movements of Net Asset Value (NAV) of mutual funds, which they could later apply and formulate their own strategies such that their portfolios are of similar composition to their preferable RMFs and LTFs portfolios to generate returns of their own.*

Keywords: *Long-Term Funds (LTFs), Retirement Mutual Funds (RMFs), SET Index, Return of SET Index, Growth of Mutual Funds, Investment Strategy and Investors Initiative Guidance*

Introduction

Mutual funds have been growing in both developing and developed countries such as Jordan (Al-Jafari, Salameh, and Asil, 2013), Malaysia (Low and Ghazali, 2007), Hong Kong (Kun Chu, 2010), Germany, Japan and United Kingdom (Ben-Zion, Jay Choi and Hauser, 1996). Similar to these countries, Thailand has extensive mutual funds namely Retirement Mutual Funds' (RMFs) and Long-term Equity Funds' (LTFs) that significantly grew in terms of Net Asset Value (NAV) over the period of 2001-2013 (Association of Investment Management Companies or AIMC, 2014). This growth rate has brought acknowledgement to RMFs and LTFs as another popular investment vehicle with various benefits, such as providing personal income tax deduction and long-term profits that are preferable, especially to the retiring individuals, than interest income remitted from commercial banks. Further, for those who are beginners to direct stock market investments, investing in mutual funds would not only help them to reduce risks through portfolio diversification even with their small-scale principle, but also provide opportunities for them to study and begin to plan their investment strategies.

From 2001 accounting at 0.03% to 2013 accounting at 3.05% of market capitalization value, RMFs' and LTFs' NAVs growth have shown their progress towards becoming one of the contributors to the growth of Thailand's capital market (Association of Investment Management Companies or AIMC, 2014). Their growth rates have further implied the

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success in fund managers' performance, whether they were actively or passively managed. However, with the fact that most RMFs and LTFs have high investment allocation in securities of at least 65% according to the Stock Exchange of Thailand regulations (2014), it is logical to state that fund managers would respond to the changes in stock market index instantaneously. As for long-term responses, fund managers may adjust their portfolios either to gain abnormal returns or to maintain their investment policy. From the comparison between market capitalization of SET and NAV of RMFs and LTFs, the latters are deemed to be growing alongside with the former, which could indicate long-run unidirectional relationship from SET Index to Top 10 RMFs and LTFs. In order to confirm the existence, the researcher focuses on examining the price linkages through one-way causality test between Top 10 Retirement Mutual Funds (RMFs) and Long-term Equity Fund (LTFs) ranked by Morningstar (Thailand) (1) and Stock Exchange of Thailand Index (SET Index) over three and half years period from January 2011 to May 2014. The study will reveal whether or not the previous changes of SET's Index have an impact on mutual funds' NAVs. The findings from this investigation could be applied to the investors' analysis that the change of one variable could be predicted from the previous change of another variable. The value of this study, therefore, would be comparable to the initiation and guidance for the new and current investors to start observing the responses of fund managers and their management strategies before making a direct investment in the Stock Exchange of Thailand.

Statement of Problem and Research Objective

RMFs and LTFs were able to heighten their total net asset values for the past decade due to their benefits of lowering investors' cost and diversification of portfolio that lower investors' risk. Their growth has increased with an observable trend that somewhat corresponds to the SET Index. While the synchronous relationship could be explained by high securities investment in RMFs and LTFs portfolios, the long-term impacts between these variables remain ambiguous. To find out this linkage, the research has been addressed to study one-way casual impacts of SET Index to Top 10 RMFs and LTFs. In other words, the study will investigate if the return of Stock Exchange of Thailand Index (SET Index) has a significant long run relationship with (Granger cause) returns of Top 10 RMFs and LTFs ranked by Morningstar Thailand on 2nd June 2014.

Scope of Research and Limitation

Secondary data including SET Index and Net Asset Value of Top 10 RMFs and LTFs ranked by Morningstar (Thailand) are used to determine the long-term unidirectional causal relationship in this study. The set of these time series data are on daily basis ranging from January 2011 to May 2014. In this study, the independent variables are the return of SET Index and Top 10 RMFs and LTFs, while the latter also take the role as the study variable.

The limitation to this study, despite the value of the research in providing basic guidance for investors, is that the justification of the findings does not cover the quantified evaluation of fund managers' performance in term of their responsiveness to the percentage change of SET Index. Thus, it is suggested that the evaluation should be examined in further research. In addition, there may be other variables such as sector indices and other benchmarks that could cause the percentage change of RMFs and LTFs NAVs, which could assist the investors on their strategies and could also be examined in further research. The aim is to

provide investors with information to invest in the most preferable mutual funds and to serve as sources for the investors to formulate their investment strategies.

Significance of the Study

The findings show that the value of this research lies in the investors' observations and understanding that they could deduct from the fund managers' strategies. Given the differences in expectation, each investor should study how professional managers respond to the fluctuations, before directly investing in the stock market. The investors could utilize the findings to apply in their investment strategies and decisions to select the most preferable mutual funds.

Background of the Stock Exchange of Thailand and Top 10 RMFs and LTFs

To comply with the Stock Exchange of Thailand's investment policy, RMF and LTF are required to have on average 65% of the total net asset values invested in equity instrument for every accounting period. When adding the fund's investment objective to this requirement, the change of SET Index is bound to have a certain impact on the mutual funds NAVs. Given this casual impact presumption, the continuous growth of SET Index and advantages from these special types of mutual funds had signaled return opportunities for the investors. In order to seize these opportunities, it is beneficial for the investors to look into the performance and development of all variables as described below:

The Stock Exchange of Thailand and its growth and development

The Stock Exchange of Thailand (SET)

The Stock Exchange of Thailand (SET) is Thailand's sole stock exchange that offers full exchange services bolstering the development of Thailand's capital market. SET's main functions in securities market involves trading and listing, clearing and settlement, depository, and regulation supervisions. SET provides both front and back offices service for investors and brokerage firms and registrar services.

SET Growth and Development

Since 1977, investment in equity instrument value has been increasing from 13% of outstanding value of bank lending, equity market, and bond market to 35% in 2013 (Jotikasthira, 2014). Its growth has increased by 101% from 2009, equivalent to 90% of Thailand Gross Domestic Products. This result has been led by the increasing number of individuals, institutions and foreigners investing in SET as well as the market capitalization of increasing newly listed companies. In addition, the existing companies have also raised their equity capital, which added further growth to Thailand's capital market.

In 2013, SET has an average daily trading value of 1,576 billion US dollars, an increase from 1,002 billion US dollars in 2012, which is the highest compared to stock exchange market among other ASEAN countries. As of the same year, SET also has 22 listed companies with market capitalization of more than one billion US dollars, an increase from 7 companies in 2008. In fact, SET has the highest compound annual growth rate (CAGR) compared to other regions in the world of 9.6% from 2004 to 2013. When compared to other financial assets, Thai stocks also have the highest CAGR of 6.5% of real returns (Jotikasthira, 2014). In the long-term aspect, SET index performance has been increasing with short-term volatility from 2005 to 2013 even with a significant negative impact on events that had occurred occasionally (Jotikasthira, 2014).

This promising growth and development of SET is in fact the result of incremental operating performance of the Thai listed companies, mainly lead by their

business expansion. According to Jotikasthira (2014), incomes and net profits of Thai listed companies increased from 6,280 billion Thai Baht and 240 billion Thai Baht in 2009 to 11,041 billion Thai Baht and 782 billion Thai Baht in 2013, respectively.

The main reason for the significant growth of listed companies' earnings is due to their strategies of expanding abroad and their performance in these international markets. At present, Thai listed companies' have invested and expanded their business to other ASEAN countries, other emerging regions, and the developed countries, which is also known as reverse foreign direct investment. The number of these expansions has increased in ASEAN region from 48 companies in 2006 to 68 in 2012 and in other regions from 85 companies in 2006 to 136 in 2012. There are many Thai listed companies that have invested in other ASEAN countries (i.e. The Siam Cement Group, PTT Public Company Limited, Minor International PCL and etc.); and, the Thai listed companies that expand to other regions (i.e. PTT Exploration and Production PCL, Thai Union Frozen Products PCL, Central Group and etc). These multinational Thai listed companies have shown significant growth in revenues of CAGR 19% from 2006 to 2012. At this growth rate, the revenues from foreign expansions have covered up to 40% of Thai listed companies' total revenues in 2012 (Jotikasthira, 2014).

In fact, Thai listed companies' total revenues will be able to grow even further as Thailand's GDP is expected to grow by 4.7% CAGR from 2015-2018, as forecast by IMF's World Economic database as of October 2013. This growth will also become another supporting factor to the stability of Thailand's equity market. Therefore, given all of these developments both in equity market and listed companies operating results, investors have opportunities to gain higher returns when investing in SET than in other markets.

Top 10 Retirement Mutual Funds (RMFs)

1) Bualuang Equity RMF (**BERMF**) emphasizes its investments in companies with solid financial positions mostly in Asia's emerging markets.
2) UOB Equities RMF (**UOBEQRMF**) mainly invests in equity instruments strong in financial figures or have the tendency to be in the near future. Currently, UOBEQRMF invests mainly in Asia's emerging markets.
3) Equity Retirement Mutual Fund-UOB (**ERMF**) invests in security of companies within emerging Asian markets that are listed in SET or in the progress as well as other assets that could hedge against its investment risks.
4) Aberdeen Smarty Capital Retirement Mutual Fund (**ABSC-RMF**) has the objective to diversify its portfolio to generate return for the investors at acceptable level of risk, focusing mainly in the companies with solid financial foundation in emerging markets of Asia.
5) Krungsri SET100 RMF (**KFS100RMF**) focuses only on investing in listed companies in SET100 Index. Its objective is to generate returns on investment as close to or exceeding the return of SET100 Index. To serve this objective, the fund portfolio composes of securities of similar proportion to SET100 Index. As for the fund's performance from applying passive management, the value has continuously increased from 2009, but later declined with small fluctuations in the recent years.
6) JUMBO 25 Retirement Mutual Fund-TMB (**JB25RMF**) focuses on being fully invested at all times. The securities invested are in the Top 25 companies, which are ranked based on the criteria set by the fund management team. The fund

managers will review the companies' market capitalization, net profits from operations, dividend payments or announcements, liquidity ratio and diversification level of the selected securities in each sector. To ensure that the fund is always investing in the Top 25 companies, the adjustments are made twice a year.

7) Valued Stock Retirement Mutual Fund (**V-RMF**) has been growing in the last five years (2009-2014) through investments in emerging Asia markets with securities that hold strong financial background and are traded at reasonable price.
8) Krungsri Dividend Stock RMF (**KFDIVRMF**) has its priority is to invest in securities with a high market value, then to invest in securities that offer high dividend payments and lastly in securities categorized into those with small and medium market capitalization. Also, the fund is entitled to invest in any option derived from securities it has invested. The remaining total net assets will be invested in bonds, hybrid securities, and other assets as permitted by the SET such as derivatives, excluding Structure Note.
9) K Equity RMF (**KEQRMF**) has a policy to invest in 65% of its total net assets in securities listed in SET, maximum of 25% in foreign securities and the remaining in cash savings, financial instruments, debt instruments, and other assets that are permitted under the regulations of SET. The selected securities have solid financial position to serve the fund's objective on generating stability and appropriate return at acceptable levels of risk for its investors. The fund may choose to invest in forward contracts or other derivative products to achieve efficient portfolio management; however, the fund will not invest in Structure Note.
10) TMB SET50 Retirement Mutual Fund (**TMB50RMF**) has the policy to always be fully invested in order to generate returns as close to SET50 Index as possible. The selected securities are common stocks invested in the proportion similar to that of SET50 Index.

Top 10 Long-term Equity Funds (LTFs)

1) Good Corporate Governance Long Term Equity Fund (**CG-LTF**) invests in securities of listed companies with good corporate governance. The fund mainly invests in Asia's emerging markets.
2) Manulife Strength-Core Long-Term Equity Fund (**MS-CORE LTF**) focuses its investment in listed companies categorized under SET50. The fund invests mainly in Asia's emerging markets.
3) Aberdeen Long Term Equity Fund (**ABLTF**) policy focuses on investing in medium to long-term equity instruments that has strong financial foundation with continuous growth rate. The selected equities are based on the professional team analyses, determining from the selection pool of the Top 150 listed companies with the highest market value at reasonable diversification level. The objective is to generate returns on investment on a long-term basis for the investors and encourage long-term investments from institutions in SET.
4) Bualuang Long Term Equity Fund (**B-LTF**) focuses on long-term investment in common stocks of the listed companies that have strong financial foundation and potential to generate high returns. It invests mainly in emerging Asia market majorly in equities and the remaining in debt instruments, cash savings and other assets as permitted by SET.
5) Big Cap Dividend Long Term Equity Fund (**BIG CAP-D LTF**) focuses on investing in large capital securities that has a total market value of more than 2% compared to the benchmark of overall securities with solid financial foundation,

satisfying operating result, and tendency of high growth rate. The fund has outperformed other securities within the same category as well as SET50 Index. Its main investment is in Asia's emerging markets.

6) Phillip Long Term Equity Fund (**P-LTF**) investment policy has the objective to invest in equity instruments, such as common stocks of the listed companies in SET with solid financial foundation or that are categorized as growth stocks. Other assets that would be invested are under the SET's consent such as derivatives products including Structure Note for hedging purpose. P-LTF has outperformed others within its category of equity large capitalization as well as SET50 Index. Its main investment is in emerging Asia markets.
7) UOB Long Term Equity Fund (**UOBLTF**) mainly invests in business sectors with high potential for growth by selecting securities that have a consistent dividend payment policy, transparency and having good corporate governance and market value that is lower than the perceived value of the security based on fund's management team evaluation. UOBLTF will also invest in financial or debt instruments. Its main investment market is in emerging Asian countries.
8) Value Plus - Dividend Long Term Equity Fund (**VALUE-D LTF**) focuses its investment on equity of the listed companies in SET with solid financial foundation, satisfying operating results, tendency of consistent growth, and financial stability. The fund's main investment market is in emerging Asia.
9) Bualuang Long Term Equity Fund 75/25 (**BLTF75**) has an objective to invest in common stocks of the listed companies that have solid financial foundation with high growth potential in Asia's emerging market. The securities proportion in BLTF75 portfolio would be between 65%-75%. The remaining would then be invested in debt instruments, cash savings, and other assets as permitted SET. However, the fund will not invest in derivatives products or Structure Note.
10) One-asset Selective Growth Long Term Equity Fund (**1SG-LTF**) has objective to invest in the listed companies in SET or those that are in progress. Approximately, there are 30 companies within the fund portfolio that are selected based on the tendency of generating satisfying operating results, potential of high growth rate, and frequency of dividend payments. Through this selection criterion, the investors will have an opportunity to gain high return from the increase in NAV, interest income, and dividend remittance. The main region of the fund investment is in Asia's emerging market.

Previous Studies

Al-Jafari, Salameh, and Asil (2013) studied the relationships between Amman's Stock Exchange Index (ASEI) and Net Asset Value (NAV) of selected mutual funds namely Jordinvest First Trust Fund, Growth Fund, Horizon Fund, and Jordan Securities Funds. The research methodologies involving Unit Root Test, Regression Model, Error Correction Model and Granger Causality tests were applied to examine the validity of data and investigate the existence of short-term and long-term relationships between variables. The data applied consisted of Net Asset Value of the four mutual funds on monthly basis as well as closing price of ASEI. These time series data were collected from 31 March 2005 to 30 November 2009 and were tested for bidirectional relationships, which mean that ASEI and the four mutual funds took turn on being both dependent variables and independent variables. The rationale was to find whether mutual funds reflected the movement in the

change of stock index in other words moving in parallel, or the fund managers remain active that the trends of mutual funds value do not show long-run relationship with the stock index. The study also examined whether mutual funds have sufficient impact on the stock index both in short-term and long-term. The findings to these relationships would assist the investors to select mutual funds most suitable to their preferences. The results showed that there was only a one-way positive long-run relationship from ASEI to all four mutual funds. For the short-term relationships, only Growth Fund, Horizon Fund, and Jordan Securities Funds showed significant positive one-way impact on ASEI and only Jordinvest First Trust Fund was significantly affected by ASEI. These findings implied that active fund managers were in a better status in gaining abnormal returns from Amman's Stock Market.

In the study of Low and Ghazali (2007), the findings did not suggest any long-term relationships between the stock market and unit trust funds in Malaysia, but found one-way causality relationship from stock index to some unit trust funds. Starting with their main objective to find out the relationships of prices in short-term and long-term between Kuala Lumpur Composite Index (KLCI) and 35 Malaysian unit trust funds, Low et al. (2007) collected financial data monthly basis from January 1996 to December 2000, 4 years period. Before beginning with research testing methods, Augmented-Dickey Fuller (ADF) was performed to ensure that the data were stationary. Next, Co-integration was used to analyze the existence of long-run relationship and then Granger Causality test was used to determine the short-run relationships. The study revealed that there were no bidirectional long-run relationship between KLCI and unit trust funds, which means that mutual funds' Net Asset Value (NAV) may differ significantly from KLCI, with the possible reasons may be of fund managers having to maintain their investment policies and proportion of securities, accordingly. Further to this justification, it could also be implied that investing in mutual funds are not an alternative tool to directly invest in the stock market.

Applying similar research methodologies from the study of Low et al. (2007), Kun Chu (2010) performed Co-integration to test for long-run relationships and Granger Causality to test for short-run relationships between Hong Kong Mandatory Provident Fund (MPF) scheme and Hong Kong stock market index. The primary objective of this study was to examine whether investing in mutual funds could become substitute to direct stock investment at investors' retirement period. The data comprised of prices of equity funds and indices from 2001-2008, after which were later tested for spurious effect by Augmented Dickey-Fuller (ADF) unit root test. When all research methodologies were tested, it was found that 56.43% of mutual funds were co-integrated with their benchmark indices, indicating that majority of mutual funds were designed to move in parallel with stock market index. However, for those mutual funds with no long-term relationships, they were found to have significant short-term impact with stock market index. These findings have made the conclusion that in some unit trust funds, the managers chose to respond actively by selecting the right securities at the right time to gain abnormal returns, and that there are other funds that rely on passive management.

With a similar purpose, Ben-Zion, Jay Choi, and Hauser (1996), set their study by collecting closing prices on a daily basis from Germany, Japan and UK funds that were traded in New York Stock Exchange as well as the daily index of DAX index (Germany), Nikkei index (Tokyo), FTSE index (London), and S&P 500 index (New

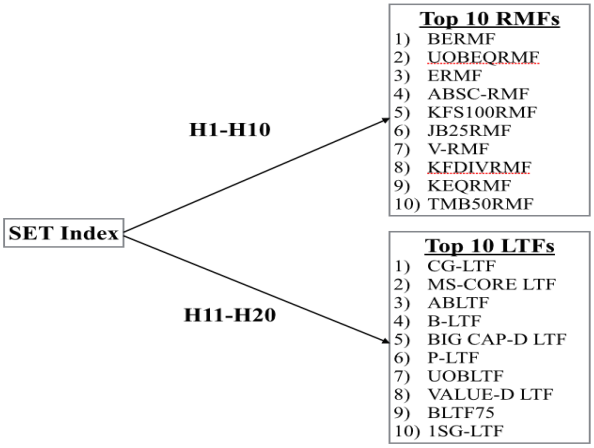
York) translated in terms of US Dollar from 1st December, 1987 to 28th February, 1990. The data collected were first tested for spurious effect using the unit root test, followed by co-integration tests for long-term relationships and causality tests for short run relationships. Both funds and indices were used as both dependent and independent variables to determine whether the relationships are bi-directional. The additional objective to this study was to examine if foreign mutual funds from Germany, Japan and UK could be used as indirect investment tools to invest not only in their local markets but also in the US. The findings in this research indicated a two-way causal relationship and revealed that only UK's fund price was co-integrated with US index in both directions.

Alexakis, Miarchos, Patra, and Poshakwale (2004) further examined the causality relationships of returns on stock index and flows of mutual funds in the Greek market and found that bidirectional relationships existed between these variables. The reasons for the causal effects were the investors' sentiment effect that was presented in emerging stock markets and investment laws that mutual fund managers had to comply with. Further, the requirement to maintain securities at desired proportion had turned to demand that caused stock prices to rise and fall when demand for cash were later preferable. The result of co-integration also indicated this causal effect from mutual fund flows to stock returns; however, it should be noted that stocks chosen in this study were blue-chip stocks that were attentively observed by the institutions. Thus, in Greek market, not only stock returns could cause a change in mutual fund flows, but also vice versa. As confirmation to these findings, another study in the Turkish market was conducted, using vector error correction model for short-run effect and co-integration for long-run relationships, Aydogan, Vardar and Tunc (2014) tested these methodologies on data from Borsa Istanbul and selected mutual funds, finding also bidirectional casual relationships.

Research Conceptual Framework

Based on the previous studies, many researchers found both short-term and long-term bidirectional relationships between the stock market index and mutual funds. However, in this study, long-term relationship is defined as time-lagged responses from mutual funds to the changes of SET Index, implying similar meanings to the short-term relationships, as defined in the previous studies. Further, the researcher will only examine unidirectional relationship from SET Index to Top 10 RMFs and LTFs. Given these differences and limitations, the researcher formulates the research conceptual framework shown in Figure 1 to find out the existence of the one-way causal relationship.

Figure 1: Research Conceptual Framework



Research Models

Following the previous studies of other stock markets and different types of mutual funds, the researcher adapted the research models into one that is justifiable to examine the unidirectional relationships between SET and Top 10 RMFs and LTFs. The research model of this study is shown in Figure 2.

Figure 2

Unidirectional Relationships: SETINDEX and TOP 10 RMFs	
SET INDEX → TOP 10 RMFs	$\Delta NAVRMF_{it} = \alpha_i + \beta_1 \Delta SETINDEX_{t-1} + \beta_2 \Delta SETINDEX_{t-2} + \ldots + \beta_n \Delta SETINDEX_{t-n} + \gamma_1 \Delta NAVRMF_{it-1} + \gamma_2 \Delta NAVRMF_{it-2} + \ldots + \gamma_n \Delta NAVRMF_{it-n} + \mu_{it}$
SET INDEX → TOP 10 RMFs	$\Delta NAVLTF_{it} = \alpha_i + \beta_1 \Delta SETINDEX_{t-1} + \beta_2 \Delta SETINDEX_{t-2} + \ldots + \beta_n \Delta SETINDEX_{t-n} + \gamma_1 \Delta NAVLTF_{it-1} + \gamma_2 \Delta NAVLTF_{it-2} + \ldots + \gamma_n \Delta NAVLTF_{it-n} + \mu_{it}$

where:

α_i = Unknown constant of Top 10 RMF *i* or Top 10 LTF *i* at time *t*

μ_{it} = Error term of Top 10 RMF *i* or Top 10 LTF *i* at time *t*

Dependent Variables

$\Delta NAVRMF_{it}$ = Return in Net Asset Value of RMF *i* at time *t*

$\Delta NAVLTF_{it}$ = Return in Net Asset Value of Top 10 LTF *i* at time *t*

Independent Variables

$\Delta SETINDEX_{t-n}$ = Return of SET Index at time *t* Day-Lagged *n*

$\Delta NAVRMF_{it-n}$ = Return in RMF *i* at time *t* Day-Lagged *n*

$\Delta NAVLTF_{it-j}$ = Return in LTF *i* at time *t* Day-Lagged *n*

Research Hypothesis Structure

H_O: Return of SET Index does not have a significant long run relationship with (Granger cause) return in **LTF/RMF** NAV.

H_a: Return of SET Index has a significant long run relationship with (Granger cause) return in **LTF/RMF** NAV.

Data Collection

To examine the unidirectional relationships from SET Index to Net Asset Value of Top 10 RMFs and LTFs ranked by Morningstar (Thailand) retrieved as of date 2nd June 2014, the daily financial data were collected and investigated over a time period from 1st January 2011 to 30th May 2014. This implies that data of each variable are in time series consisting of 833 observations that were obtained from historical records of SET Index from Siam Commercial Bank and of Net Asset Value (NAV) of Top 10 RMFs and LTFs from Wealth Management System Limited (WMSL).

Statistical Treatment of Data

Unit Root Test

With the objective to avoid spurious effect when testing for causal relationships between variables, the time series data were first tested for the presence of non-stationarity by applying unit root tests based on Augmented Dickey-Fuller (ADF) model (Dickey and Fuller; 1979, 1981). Presuming that the latter situation existed at level form, taking LN differences in the time series data would translate the data to stationarity, which indicate that the mean values of the variables were only temporarily deviated from its long run mean as a result from the change in the financial trends and that the data are at the state valid for further testing. The ADF test applied on each variable in this study was conducted from the ordinary least square (OLS) estimation shown in the equation below:

$$\Delta Y_t = \alpha_0 + \beta Y_{t-1} + \sum_{i=1}^{m} \delta_i \Delta Y_{t-1} + \mu_{it}$$

Granger Causality Test

In order to serve the primary purpose of the study in determining the existence of unidirectional relationships from SET Index to Top 10 RMFs and LTFs, the researcher chose to apply Granger model (1969). The two-way causality impact would determine if the return in the independent variable (x) caused return in the dependent variable (y) and for how long until the impact took place. In other words, Granger causality determined if previous return in X could explain and predict the current return in Y with how much time-lagged it was and vice versa. It is, however, important to note that Granger causality test does not indicate that return in y is the result from return in x, but merely imply that return in y is an antecedent of return in x. However, in this study, the researcher set the scope of research to only examine only one-way causality test.

As adapted in the research model, the generic equation modified as applied in the previous studies of Al-Jafari, Salameh and Asil (2013), Low and Ghazali (2007), and Kun Chu (2010) is presented below:

$$\Delta y_{it} = \alpha_i + \beta_1 \Delta x_{t-1} + \beta_2 \Delta x_{t-2} + \ldots + \beta_n \Delta x_{t-n} + \gamma_1 \Delta y_{it-1} + \gamma_2 \Delta y_{it-2} + \ldots + \gamma_n \Delta y_{it-n} + \mu_{it}$$

Results of Unit Root Tests (Augmented Dickey-Fuller tests)

Prior to Granger Causality tests, time series data were adjusted into stationary condition for validity of the research findings. For each variable, the researcher eliminated spurious effect by taking LN differences in the series. After taking ADF tests on the converted data, the researcher found that all variables achieved stationarity. This implies that by taking LN difference, the results indicate that the null hypothesis, which assumed that the variable contains a unit root, is rejected and alternative hypothesis is accepted. Thus, from these results, the researcher concluded that the time series data at LN difference of all variables are valid to be employed in Granger Causality tests.

Results of Granger Causality Test

From the p-values of the Granger Causality Test in table 1, the researcher found that there are 7 out of 20 hypotheses that indicate unidirectional relationship between return of SET Index and that of Top 10 RMFs and LTFs with at least 90% confidence level. The result confirms that there are time-lapse responses of the mutual funds to the previous return of SET Index, which indicate the reaction upon the cumulative effect of the previous percentage change of SET Index and of its own return.

Discussions and Conclusion

This research had been conducted mainly to benefit the investors, the results of the hypothesis testing could be inferred as basic guidelines for investors; the findings would help these investors to choose the most suitable mutual funds and to formulate their own strategies when making a direct investment. The primary purpose of the research is to find out whether there is a long run relationship from return of SET Index to the return in TOP 10 RMFs and LTFs. To do so, the researcher applied Granger Causality test based on the time series data retrieved from January 2011 to May 2014. These data were first tested to ascertain if they contained the unit root, if so, they are then transformed to be stationary data that are valid for hypothesis testing by taking the LN difference, removing the spurious effect. After repeating the ADF test, confirming that the data are stationary, the researcher tested each hypothesis and found that 35% or 7 out of 20 mutual funds were impacted by the percentage change of SET Index at the Confidence Level of 90%.

According to Low and Ghazali (2007), these results suggested that the information that caused SET Index to change had been transmitted to the TOP 10 RMFs and LTFs. Thus, to respond to this transfer of information, the adjustment of the mutual funds NAVs were made indirectly based from the percentage change of SET Index. Specifically for this research, 7 out of 20 mutual funds are shown as having time-lapse or delayed response with the percentage change of SET Index. The research of Al-Jafari et al. (2013) suggested that these mutual funds are being actively managed to achieve abnormal returns. Further, it also implied that the fund managers perceive that the information that causes percentage change of SET index has a longer impact on that of the mutual funds. For the possibility of gaining these extra returns, it is in fact possible in the Stock Exchange of Thailand as found from the research of Huij and Post (2011) that developing countries like Thailand have an inefficient market that provides opportunities for this type of return.

Nonetheless, to be most certain that

these excess returns would be achieved, the adjustment of portfolio composition to reflect the new NAV depends on various factors including: 1) the length of time the information had accumulated, 2) the rate of absorption on information of each mutual fund, 3) the objective, 4) the strategy and 5) the fund's manager ability to select securities at the correct timing. Therefore, due to the fact that each mutual fund has a different approach on these suggested five factors, each of the 7 mutual funds is consequentially found with different day-lagged responses.

KFS100RMF return reacts to the percentage change of SET Index at Day-Lagged 1-3. This means that KFS100RMF NAV at present is affected by the percentage change of SET Index in 1-3 days in prior.

The reason that SET Index has long-run impact with the fund is due to it being the indicator of overall stock market condition, the composition of the fund portfolio that mainly invests in stock market, the active strategy that adjusts the NAV to reflect new information and the fund objective that aims to generate returns close to that of SET100 Index as possible. Therefore, this indicates that the percentage change of SET Index could be used to explain and predict the return in the KFS100RMF NAV.

Return of JB25RMF NAV reacts upon the percentage change of SET Index primarily at Day-Lagged 9 and 10. This implies that return of JB25RMF at present is due to the accumulated percentage change of SET Index in the previous 9 to 10 days, respectively. These are presumably minority changes in the sense of altering the fund investment amount and reinvesting its principle and return on investment within the selected securities and not involving major changes such as relocating its investment in other companies, which refers to the new set of Top 25 companies that are adjusted twice a year and that are ranked by the fund management team based on the company's market capitalization, net profits from operations, dividend payments, and liquidity ratio. Also, the combination of these selected companies should be adequately diversified to minimize the risk. The researcher, thus, concludes that the response from JB25RMF found in this study is mainly done to serve the fund objective to always be fully invested and that it takes several days' cumulative effect for these minor adjustments to be made.

Responses of KFDIVRMF NAV to the previous percentage change of SET Index and its own NAV return are seen at Day-Lagged 5 to 8. Although, the main objective of the fund is to invest in high dividend payment companies that can be pre-determined and passively managed throughout the year, the fund also aims to invest in high market value securities to grow its net asset value. It is therefore consequential for the fund NAV to react upon the cumulative percentage change of SET Index and its own.

The impact of the previous percentage change of SET Index and KEQRMF is mainly presented at Day-Lagged 1 and 2. The primary objective of the fund is to generate satisfying returns for the investors at an acceptable level of risk. The fund management team thus chooses to invest in companies with financial stability and conducts their strategies accordingly to achieve efficient portfolio management and returns similar to or exceed that of SET Index. As a result, there is reaction upon the previous percentage change of SET Index.

Given that the aim of TMB50RMF is to generate return higher than or as close to SET50 Index as possible, the management team invests in securities proportionately similar to SET50 Index and then applied passive strategy. It is however also the fund policy to always be fully invested, thus, the management team will make some adjustment such as reinvesting its principle and return on the chosen securities, which

creates long-term responses on the previous percentage change of SET Index.

The results of this research show that there are continuous adjustments with significant probabilities at Day-Lagged 1-10 between MSCORELTF and SET Index. This implies that return of SET Index affected the NAV fund in the long run and the adjustments are made mainly to serve its objectives to generate returns that exceed or are equivalent to the SET50 Index. Thus, it is also possible for returns of MSCORELTF NAV to react actively upon the percentage change of SET Index, depending on the fund's manager strategy. As shown in Table 1, the recent percentage change of SET Index would have higher impact than those of SET Index in the later days.

UOBLTF aims to outperform SET Index and according to Morningstar Thailand, the fund was able to outperform even SET50 Index from 2012 to present, however, with wider scope of fluctuation in return. From the research findings, the probabilities at Day-Lagged 5-7 is found only at Significance Level 10%, which is considered somewhat weak impact; nonetheless, the finding indicates that there is a reaction from UOBLTF NAV upon the cumulative percentage change of SET Index.

For mutual funds that have no significant causal relationship with percentage change of SET Index. The reasons may be because (1) the fund has its own investment policy and objective that does not react upon previous percentage change of SET Index, (2) the fund aims to react correspondingly to other specific benchmarks rather than the SET Index, or (3) the adjustment of the fund's NAV depends on the management's judgment that solely relies on the invested companies' operating performance rather than the information that causes impact to SET Index.

Suggestion to the Investors

To conclude, for the investors who would like to invest directly in the stock market, they should quantify the return of SET Index and the mutual funds in order to compare and study their performances. The investors should also observe the composition and the movements of these funds as a form of response to the change of SET Index. Further, they should analyze the fund's responses to grasp the basic concept on the timing impact from the transmission of information. Additionally, for investors who need guidance on choosing mutual funds to invest, the suggestion based on this research findings would help them to choose the fund that actively responds to SET Index as they would have the highest possibility to get excess returns in an inefficient market like Thailand.

Recommendations for Further Research

The study of this research is primarily on the one-way causal relationship to identify which mutual fund return is affected in the long-run by the percentage change of SET Index and the previous return of the fund itself. The research, however, did not identify other possible variables that could affect mutual fund NAV's. Thus, for further research, this recommendation could be employed to provide guidelines for the investors who are in search of the suitable RMFs and LTFs to invest in Thailand. Moreover, the researcher also suggests future researchers to evaluate the fund management strategy and the fund manager's ability to manage and choose securities to invest as well as correct timing. This evaluation will help the investors to know which mutual funds they are satisfied with to invest and also gain investment strategy concept to apply when they directly invest in the stock market. In addition, this research could also be carried further to test the one-way causality relationship against other indices such as SET50 Index, SET100 Index and sector indices that would provide practicably new useful results to the investors.

Notes

1. Morningstar Ranking takes into account both fund's performance and risk. The assumption to which the calculation of rating is based on is the rationale that investors would rather prefer certainty in returns rather than uncertainty. In other words, rankings of mutual funds are mutual funds' total returns less volatility that are in declining movements. (Morningstar Thailand, 2014)

Table 1: Result of Granger Causality Test on Long Run Relationship between Lag Return of SET Index and Return of Top 10 RMFs and LTFs

Mutual Fund	Day-1	Day-2	Day-3	Day-4	Day-5	Day-6	Day-7	Day-8	Day-9	Day-10
BERMF	0.6167	0.7690	0.8835	0.9789	0.9485	0.8421	0.6661	0.7245	0.5402	0.6001
UOBEQRMF	0.2074	0.4537	0.6856	0.8386	0.9125	0.9446	0.7903	0.8639	0.6072	0.5351
ERMF	0.9432	0.6570	0.6715	0.7114	0.7664	0.8148	0.8873	0.9150	0.8316	0.8756
ABSCRMF	0.3823	0.5252	0.4939	0.6828	0.8374	0.7680	0.8580	0.8669	0.9209	0.9532
KFS100RMF	0.0125**	0.0216**	0.0930*	0.1747	0.1042	0.1403	0.2366	0.2598	0.2370	0.2362
JB25RMF	*0.0576	0.1541	0.4079	0.5464	0.4762	0.5347	0.5863	0.3840	0.0372**	0.048**
VRMF	0.8867	0.9823	0.8103	0.8794	0.9229	0.6738	0.5712	0.6520	0.7334	0.7612
KFDIVRMF	0.2719	0.3106	0.2963	0.4541	0.0538*	0.0421**	0.0660*	0.0925*	0.1463	0.1929
KEQRMF	0.0103**	0.0404**	0.1238	0.1946	0.0956*	0.1838	0.2179	0.2708	0.2602	0.1513
TMB50RMF	0.0147**	0.0276**	0.1188	0.2207	0.1764	0.2105	0.2817	0.1502	0.0829*	0.0934*
CGLTF	0.6109	0.6514	0.8443	0.8083	0.8260	0.8934	0.9226	0.9618	0.8847	0.9219
MSCORELTF	0.0010***	0.0029***	0.0020***	0.0083***	0.0150**	0.0238**	0.0362**	0.0461**	0.0530*	0.0605*
ABLTF	0.4827	0.6187	0.5950	0.7649	0.8761	0.7924	0.8800	0.8791	0.8893	0.9279
BLTF	0.7069	0.7566	0.8971	0.9813	0.9655	0.8418	0.7281	0.7526	0.5924	0.6530
BIGCAPDLTF	0.6479	0.8283	0.9393	0.9787	0.9266	0.9502	0.9273	0.9283	0.8972	0.6631
PLTF	0.5472	0.2920	0.4396	0.3337	0.4335	0.4824	0.3223	0.3787	0.4347	0.5237
UOBLTF	0.2365	0.3379	0.4802	0.3818	0.0503*	0.0777*	0.0914*	0.1392	0.1705	0.1234
VALUEDLTF	0.4066	0.3548	0.4182	0.4418	0.5735	0.6926	0.6009	0.6866	0.7867	0.3705
BLTF25	0.5671	0.7487	0.9103	0.9768	0.9770	0.8636	0.8793	0.8859	0.6426	0.7175
SE1GLTF	0.1281	0.2916	0.5239	0.6803	0.4852	0.4331	0.5348	0.6291	0.6950	0.4595

*** = Significant level at 1%

** = Significant level at 5%

* = Significant level at 10%

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